

REMARKS

Claims 1 and 3-9 are pending. Claim 1, the only independent claim, has been amended without narrowing its scope.

Claim 1 was rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent 6,495,916 (Ohuchi et al.). Claims 3-9 were rejected under 35 U.S.C. § 103 as obvious from Ohuchi et al. in view of admitted prior art.

Claim 1, as amended, recites, *inter alia*, that the marking member includes at least one linear portion, and the external electrodes each have a circular shape when viewing the chip package externally in a vertical direction when the semiconductor chip is held horizontally. The outline shape of the marking member includes at least one linear portion when viewing the chip package in the vertical direction.

The claimed invention includes at least one marking member including at least one linear portion formed together with plural circular shapes. The marking member is arranged so as to realize a directivity when viewing the chip package externally, from a vertical direction, e.g., from above the chip package. As a result it is possible to easily recognize the inclination of the chip, unlike in prior art designs.

Applicant thanks the Examiner for the cordial telephonic interview with the undersigned representative on July 11, 2006. During the interview Applicant's representative pointed out several differences between the invention recited in independent claim 1 and the prior art cited in the Office Action. The following arguments substantially summarize the points made at the interview.

Prior art methods of orientation must recognize inclination, for example rotational inclination, of a chip package by recognizing, i.e., discerning, imaginary lines formed by a

series of solder balls oriented in a matrix the x and y direction. However, it is difficult to recognize lines formed by a large number of objects that are distributed over a wide area, and still more difficult to calculate the inclination of such lines. To perform such a task requires complex image processing software.

Instead of requiring that the inclination be recognized by the foregoing process, the present invention allows any inclination of the chip to be recognized by visual inspection of a marking member, for example marking member 130, that itself has a linear portion. Recognition of this linear portion, and any inclination of that portion compared to a reference inclination, is easier than the prior art process of (a) discerning that a line is formed by multiple solder balls oriented across a large portion of the chip; and (b) determining the inclination of that line, as is required in the conventional method shown in Figure 6.

As shown, for example, in Figures 4A and 4B of the present application, linear portions of an index portion (e.g., 130) already form a line. This avoids the step (a) discerning a line from a series of arranged balls. Moreover, it is relatively simple to determine the inclination of such a linear portion, at least because only a small portion of the chip surface must be analyzed by an image processor to do so.

As discussed in the specification, this linear portion can be provided in a number of ways. For example, square/rectangular post 130, with a square or rectangular shape visible from outside the chip package in the vertical direction, could provide such a linear portion for alignment purposes. Another example is copper post 140A, having a square pole-like shape. Of course the invention is not limited to the illustrated embodiments at least as to the exact shape of the marking member.

Ohuchi et al. provides *cross-sectional views* showing, inter alia, solder balls 7 and posts 4. The Office Action took the position that the posts 4 correspond to the recited marking portion.

First, the marking member of claim 1, when the chip package is viewed externally in a vertical direction, i.e., in a direction (e.g., from above) in which you can see the surface of the chip package, realizes a directivity. Moreover, the outline shape of the marking member includes at least one linear portion when the chip package is viewed externally in a vertical direction, e.g., from above the chip package.

Ohuchi et al., including the figure reproduced in the Office Action, shows a cross-sectional view. Although the side cross-sectional view of post 4 includes straight vertical sides, the linear (vertical side) portions of post 4 are not visible at all from outside the chip package when the package is viewed in the vertical direction, e.g., from above, since they are *completely covered by the round solder balls 7* when viewed in that direction. Indeed, Ohuchi et al.'s description makes clear that this is so when it states that "the solder ball 7 is bonded with not only the topmost surface of the respective posts 4, *but also the sidewall face thereof, . . .*" Col. 3, lines 38-41.

Moreover, even if posts 4 could be seen from above, which they cannot, they would not include *any* linear portion when viewed in the vertical direction. That is, the posts are cylindrical in shape since they are "circular in plan view." Col. 3, line 65. Thus, even if the posts 4 could be viewed in the vertical direction, which they cannot because they are covered by the solder balls 7, they would appear *round, with no linear portions*.

In summary, the posts 4 of Ohuchi et al. cannot be said to correspond to the recited marking member at least because: (1) the posts 4 are not visible at all from outside the chip package when viewed in the vertical direction, because they are *completely covered by the solder balls 7*; and (2) even if they could be somehow viewed through the solder balls, they do not, in outline shape, include any linear portion, since they are *circular in plan view*.

During the interview, the Examiner indicated that she now understood the differences between the marking member of claim 1 and post 4 of Ohuchi et al. The

Examiner requested that it be made even more clear that the marking member's linear portion may be viewed when looking at the chip package from outside the package, for example from above, or in a plan view.

In consideration of the Examiner's remarks, claim 1 has been amended, without narrowing it, to make even more clear what is believed to have already been implicit. The outline shape includes the linear portion when viewing the chip package externally, and in the vertical direction. Examples of viewing from the vertical direction would be, for example, viewing the chip package from above, or in a plan view.

In view of the above, amended independent claim 1 is believed to clearly distinguish over the cited prior art.

The other claims in this application are each dependent from amended independent claim 1 discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Dated: August 31, 2006

Respectfully submitted,

By Joseph W. Ragusa
Joseph W. Ragusa

Registration No.: 38,586
DICKSTEIN SHAPIRO LLP
1177 Avenue of the Americas
41st Floor
New York, New York 10036-2714
(212) 277-6500
Attorney for Applicant